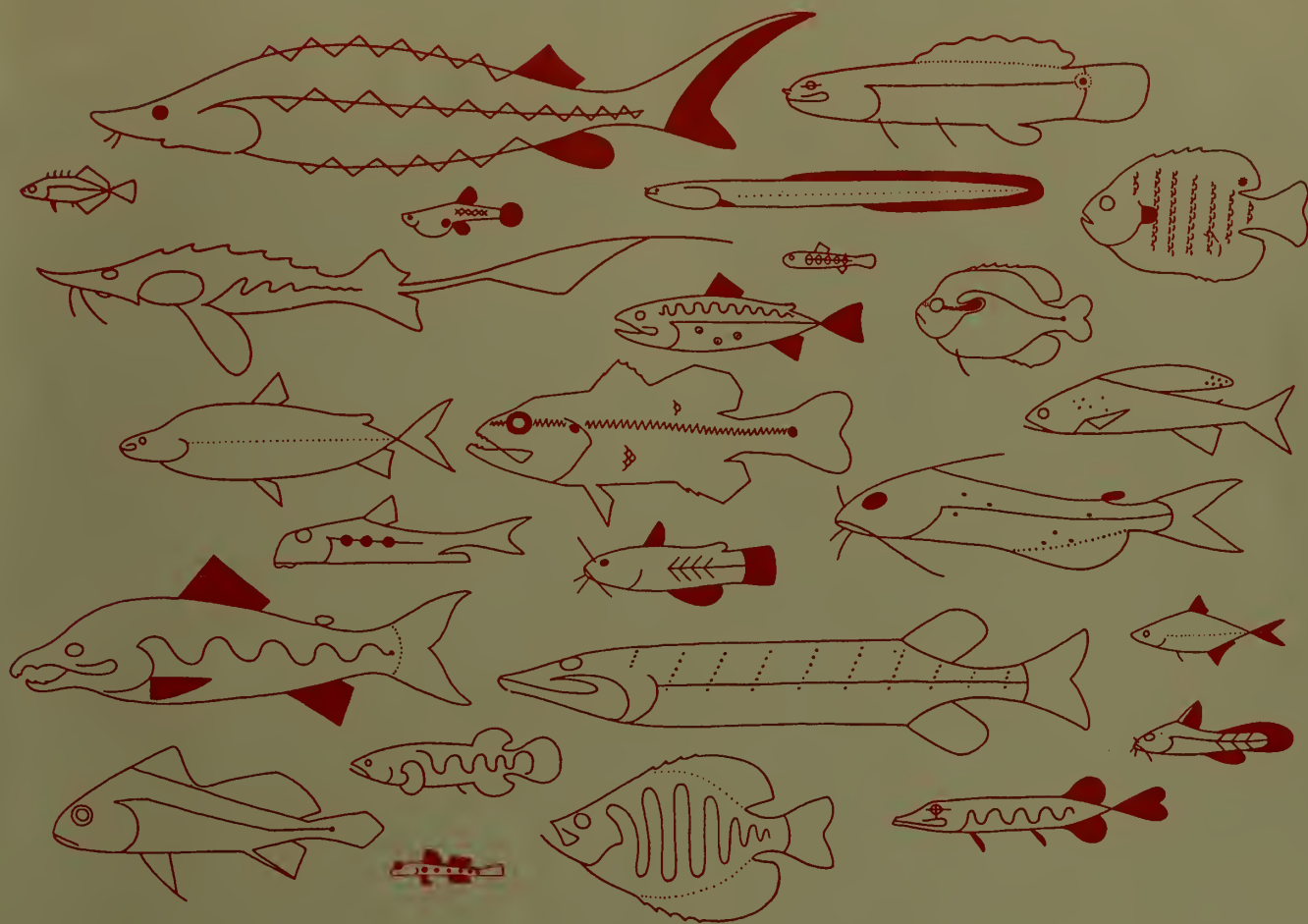




DIVISION OF FISHERY SERVICES

ANNUAL REPORT FOR 1968



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

RESOURCE PUBLICATION 79

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of this department of natural resources.

The Department works to assure the wisest choice in managing all our resources so that each shall make its full contribution to a better United States now and in the future.

Cover -- Drawing by Craig Phillips, National Fisheries Center and Aquarium, Washington, D.C.

UNITED STATES DEPARTMENT OF THE INTERIOR, WALTER J. HICKEL, *SECRETARY*
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DIVISION OF FISHERY SERVICES
ANNUAL REPORT
CALENDAR YEAR 1968

Willis King, Chief



Prepared by R. T. Webb and F. R. Richardson

Bureau of Sport Fisheries and Wildlife
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LOCATIONS OF REGIONAL OFFICES, DIVISION FIELD STATIONS AND COOPERATIVE FISHERY UNITS

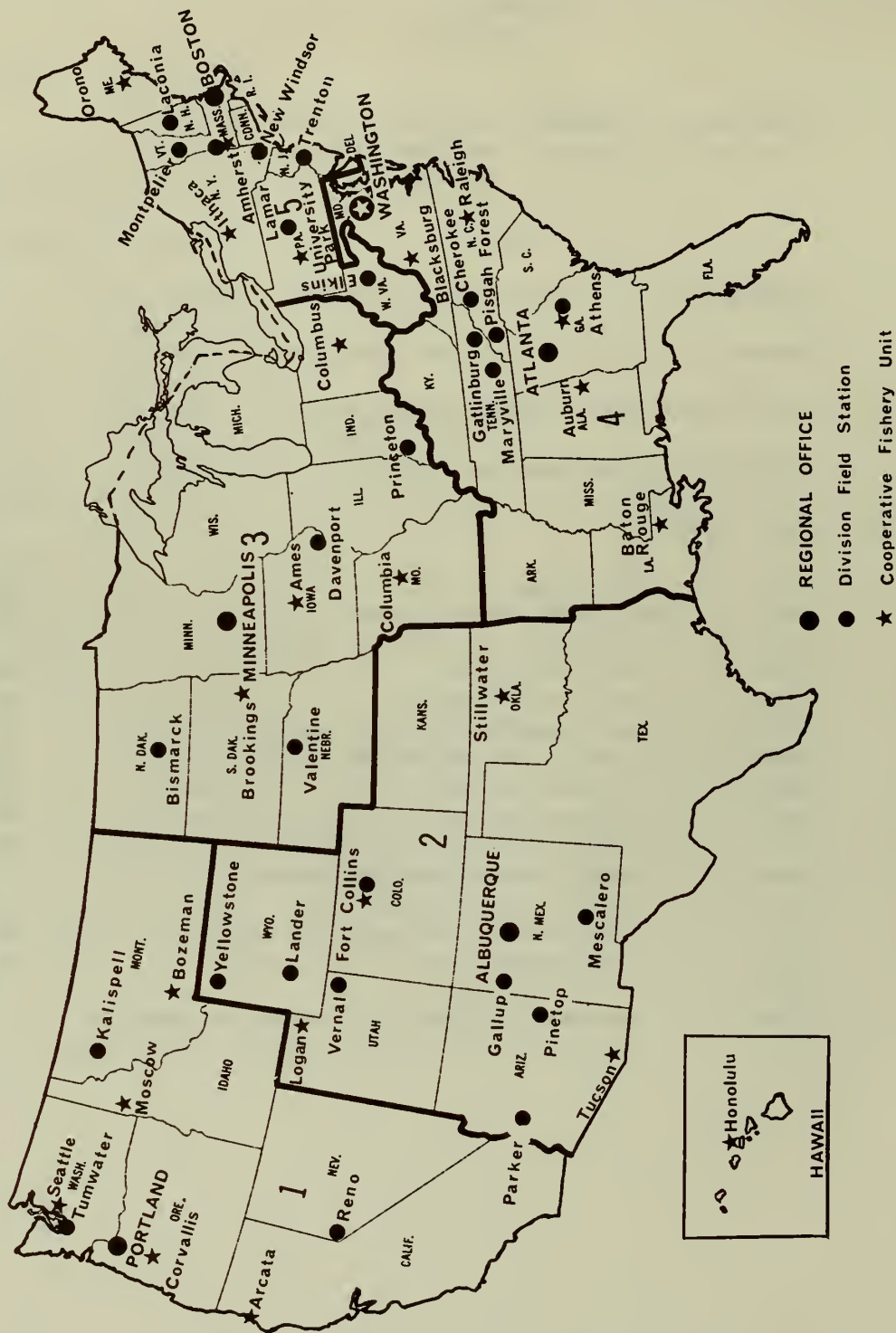


Figure 1. -- Locations of Regional Offices, Division Field Stations, and Cooperative Fishery Units.

DIVISION OF FISHERY SERVICES ANNUAL REPORT FOR 1968

The primary objective of the Division of Fishery Services is to provide sport fishing for the present and future by improving the existing sport fishery and developing new sport fisheries through the application of modern fishery management techniques learned from research and experience.

This is accomplished in the following ways:

1. By providing guidance to Federal landowner agencies and Indian tribes in the development and execution of fishery management programs so as to make the maximum fishing available without undue interference with the primary objectives of the areas.



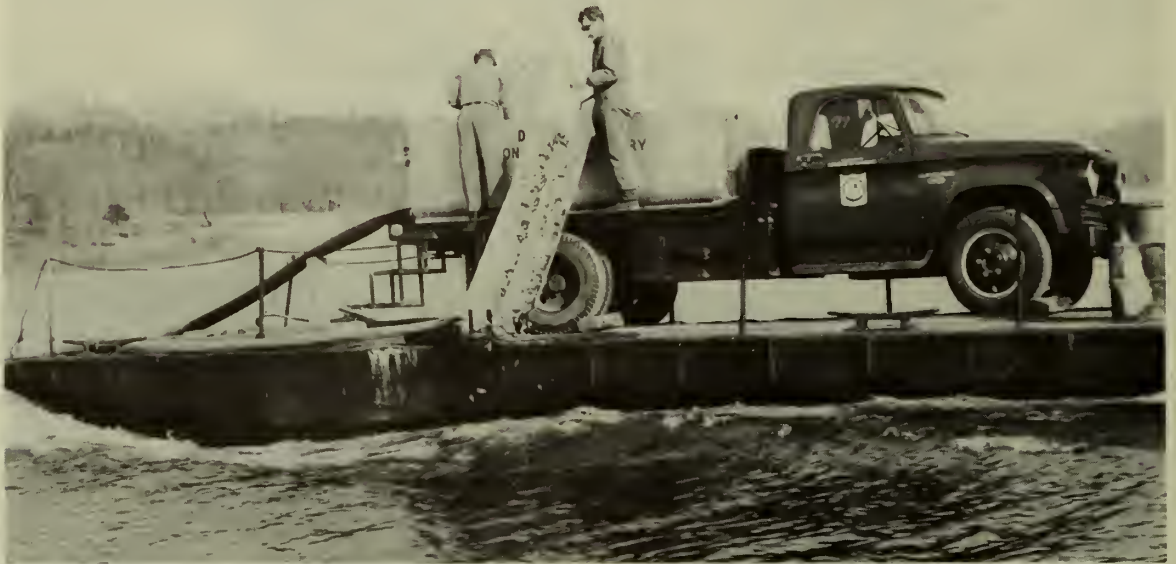
Fishway constructed on Mahogany Creek by Summit Lake Indians to provide access to spawning areas for Lahontan cutthroat trout.



Tribal member assists Division biologist in planting eyed eggs in Mahogany Creek, Summit Lake Indian Reservation, Nevada.

Fishery Services' biologists made 368 visits to Federal areas and Indian reservations in 1968. These areas have 622 thousand acres of lakes and impoundments and 11,968 miles of streams under management. They provided 6.7 million man-days of fishing during the season, which was a 15 percent increase over 1967. These waters were stocked with 16 million fish (1,557,999 pounds) from Bureau fish hatcheries.

2. By assuring that the fish produced at national fish hatcheries are stocked in such a manner as to provide maximum fishing to the angler; and to provide the necessary information which will help gear hatchery production to stocking requirements.



The Corps of Engineers provided the barge for stocking trout into Dale Hollow Lake, Tennessee. This project is designed to evaluate the results of stocking trout in a two-story reservoir.

Bureau hatcheries provided nearly 30 million fish (2.5 million pounds) for waters that are serviced by Division personnel. Areas provided assistance by the Division recorded about 8.5 million angling trips in 1968.

In October 1968, the Bureau published a "National Survey of Needs for Hatchery Fish" which was prepared by the Division of Fishery Services with assistance of the Division of Fish Hatcheries and the Division of Fishery Research. This comprehensive report which is in two parts is the result of a survey carried out by Fishery Services and Fish Hatcheries in cooperation with the 50 States. Projections on hatchery production and requirements were made to the year 2000. These projections indicate deficits will occur in parts of the United States for trout, salmon, and warm-water fish.

3. By cooperating with, and providing assistance to, the 50 States in their fishery management programs where there are mutual State-Federal interests. Duplication of effort is avoided and accomplishments are greater when both agencies work together.



Biologists from the Division of Fishery Services, States of Iowa and Nebraska, and personnel of DeSoto National Wildlife Refuge cleaning gill nets used for fish collections on DeSoto Lake.

The Division of Fishery Services and other Divisions of the Bureau of Sport Fisheries and Wildlife maintain close coordination with the States regarding activities of mutual interest. Regularly scheduled meetings are held with the State fish and game departments regarding cooperative fish stocking programs. Other cooperative projects include fishery surveys, creel censuses, limnological studies, fish control operations, pesticide monitoring and field appraisal, reservoir studies, anadromous fish programs, and pollution investigations. The success of many sport fishery programs is a direct result of the close teamwork between State and Division fishery biologists.

4. By participation in programs of training and studies at colleges and universities and by the establishment of Cooperative Fishery Units at 23 colleges and universities.



North Carolina Cooperative Fishery Unit Leader conducts fishery science students on a tour of a national fish hatchery.

Division personnel at the 23 Cooperative Fishery Units taught 38 formal fishery courses and provided supervision to 187 graduate students. In addition to the on-campus activities, unit staff members and students participate in many of the fishery management programs on Federal areas and Indian reservations. Assistance is provided to some national fish hatcheries in special fish culture projects. Many of the programs are directed at finding answers to fishery management problems in the States wherein the units are located.

5. By providing information to the public on fishery management through extension-type activities and printed materials.



Division fishery biologist Jon Nelson answers questions at a conservation display booth during National Wildlife Week.

There are some two million farm fish ponds in the United States and not nearly enough fishery biologists to periodically check them and provide management assistance. Consequently, the most common replies to the thousands of requests for assistance are in the form of letters and management literature. In some areas pond management demonstration programs are provided.

Other methods of furnishing information to the public include providing instructors at conservation camps, participating in various workshops particularly on Indian reservations and military installations, and providing exhibits at public affairs which include "conservation" as a theme. Division biologists present hundreds of programs each year to conservation organizations, civic clubs, youth groups, and TV and radio media on the Bureau's management programs.

Fishery Management Programs on Department of Defense Areas

Division activities on Department of Defense lands are carried on under cooperative agreements and plans under Public Law 86-797, the Sikes Act (74 Stat. 1052) and a Memorandum of Understanding, dated July 11, 1960, between the Department of Defense and the Department of the Interior. These cooperative agreements are signed by a representative of the military base, the Bureau of Sport Fisheries and Wildlife, and usually the State fish and game department. Activities are coordinated with other Federal and State agencies.

Fish management services were provided to 151 Department of Defense installations in 39 States during 1968.



The management program on the United States Air Force Academy lake includes annual trout stocking from Bureau hatcheries.

The 24,185 acres of lakes and ponds and the 135 miles of streams under management provided nearly 1.4 million man-days of sport fishing to military and civilian anglers. This represented an annual increase of nearly 13 percent over the previous year. About 1.8 million fish were provided by Bureau hatcheries for this program.



Treating aquatic weeds with a liquid herbicide at Camp Pickett, Virginia. U.S. Army Photo.



Opening day fishing scene on one of the managed lakes, Eglin Air Force Base, Florida. U.S. Air Force Photo.

Fish management activities on military lands are usually adapted to a long-range plan which takes into consideration the primary objectives of the installation, the potential, and the need for recreation. The plans include construction of new impoundments, renovation of existing waters, stream improvement, stocking of both new and renovated waters, and routine field investigations to determine the condition of the waters.

A good example of a well-managed fishery program is found at Fort Gordon, Georgia. The 24 managed lakes provide the military and civilians with an excellent and diversified fishery. The anglers can fish for trout, channel catfish, white catfish, bass, bluegill, redear sunfish, blue catfish, striped bass, and pickerel.



The results achieved from treating a channel catfish lake on Fort Gordon, Georgia, with antimycin to eliminate competing species of fish.

The Department of Defense Conservation Award was established in 1962 to recognize the most outstanding military conservation program of the year. The following installations have won this coveted award:

- 1962 - Fort Knox, Kentucky
- 1963 - Eglin AFB, Florida
- 1964 - Tyndall AFB, Florida
- 1965 - U.S. Naval Weapons Station, Virginia
- 1966 - Fort Rucker, Alabama
- 1967 - Red River Army Depot, Texarkana
- 1968 - Camp Lejeune, North Carolina

Table 1.--Department of Defense Areas Served During 1968

<u>State</u>	<u>Air Force</u>	<u>Army</u>	<u>Navy & Marine Corps</u>	<u>State</u>	<u>Air Force</u>	<u>Army</u>	<u>Navy & Marine Corps</u>
Ala		2		Nev			1
Ariz		2		N.H.	2		
Ark		2		N.J.		2	2
Calif	4	5	5	N. Mex		1	
Colo	2	4		N.Y.	2	3	
Fla	5		4	N.C.		2	2
Ga	3	5	1	Ohio	3	2	
Ill	3	2		Okla	1	1	1
Ind		3		Oreg	1		
Iowa		1		Pa		5	
Kans	1	2		R.I.			4
Ky		1		S.C.	2	1	1
La	1			S. Dak	1		
Maine	1		3	Tenn		3	1
Md	1	4	3	Utah	1	2	
Mass	3	2		Va		11	5
Mich	2			Wash	2	3	1
Miss			1	Wis		1	
Mont	1			Wyo	1		
Nebr	1			Total	44	72	35



Bigler Mill Lake on Camp Peary, Virginia, is the largest fertilized body of water managed by Division biologists. This lake provides outstanding fishing.

Fishery Management on Veterans Administration Areas

Technical assistance to fishery management programs was provided at 19 Veterans Administration hospitals in 1968. Fishing is a very popular form of recreation by patients as illustrated by the 39,700 man-days of fishing reported on 177 acres of ponds and lakes during the year. To help sustain the fishery, 24,900 fish from national fish hatcheries were stocked. On some waters in this program, angling pressure exceeded 550 trips per acre in 1968. The increasing use of the relatively few acres of water available for fishing to VA hospitals indicates the popularity and benefits of the program.



Managed fishing waters on Veterans Administration lands provide a source of outdoor recreation for the disabled veterans.

Fishery Management Programs on National Forests

Fishery management services are provided to National Forests and Grasslands in accordance with a Memorandum of Understanding between the U.S. Forest Service and the U.S. Fish and Wildlife Service in cooperation with State fish and game agencies. Assistance provided to the Forest Service consisted of fishery investigations, stocking and management recommendations, habitat reclamation and improvement, creel census, developing overall watershed management programs, and compiling water inventories for incorporation in the Forest Service's long-range total use plans.

During the year, visits were made to 13 National Forests and one National Grassland. Twelve of these forests are located in the eastern United States. These areas contain over 21,000 acres of lakes, ponds, and reservoirs and 5,900 miles of streams. In 1968, National Forest waters provided 1,822,900 man-days of fishing and were stocked with 1.8 million fish from Bureau hatcheries.



Cooperative Fishery Unit students are briefed by a biologist prior to assisting in a stream survey in Allegheny National Forest.

Table 2.--Summary of Activities on National Forests

<u>State</u>	<u>National Forest</u>	<u>Fish Stocking</u>	<u>Surveys</u>	<u>Creel Census</u>	<u>Water Improvement</u>
Georgia	Chattahoochee	X	X		X
Illinois	Shawnee		X		
Kentucky	Daniel Boone	X	X	X	X
Nebraska and South Dakota	Central Plains		X		X
New Hampshire	White Mountain	X	X		
North Carolina	Nantahala	X			
North Carolina	Pisgah	X			
Pennsylvania	Allegheny	X	X		
South Carolina	Francis Marion	X	X	X	
South Carolina	Sumpter	X	X		
Vermont	Green Mountain	X	X		
Virginia	George Washington	X	X		
Virginia	Jefferson	X			
West Virginia	Monongahela	X	X		X



A fishing lake in the Green Mountain National Forest. Photo - U.S. Forest Service.

Fishery Management Programs with the National Park Service

A Memorandum of Understanding approved by the Assistant Secretary of the Interior for Fish and Wildlife and Parks in 1966 provides for technical assistance in National Park Service fishery programs. In 1968, the Division provided some assistance to 11 of the 273 National Park Service areas. Nearly a million man-days of fishing occurred on the 137,860 acres of lakes and ponds and 2,385 miles of streams on these 11 areas. The annual fishing pressure increased five percent. National fish hatcheries released 700,000 fish into Park Service waters to supplement low density populations.



Two procedures used in stocking trout in the Glacier National Park--a hard way and an easy way.

Table 3.--Parks Receiving Technical Assistance

Blue Ridge Parkway, North Carolina and Virginia
Cumberland Gap National Historical Park, Kentucky, Tennessee, and Virginia
Glacier National Park, Montana
Great Falls Park, Virginia
Great Smoky Mountains National Park, North Carolina and Tennessee
Mount Rainier National Park, Washington
Olympic National Park, Washington
Prince William Forest Park, Virginia
Rocky Mountain National Park, Colorado
Shenandoah National Park, Virginia
Yellowstone National Park, Wyoming, Idaho, and Montana



The Rocky Mountains in the background provide a scenic view for this successful angler in the Rocky Mountains National Park. Photo - National Park Service.

Comprehensive investigations were continued at Yellowstone and Great Smoky Mountains National Parks. These two areas provide approximately 60 percent of the total man-days of fishing in Park Service waters where Division assistance is provided. Project biologists are stationed full time at these parks.

The planting of the westslope cutthroat into Glacier National Park waters continues to be an outstanding management activity as part of a long-range Federal-State cooperative venture to re-establish native fishes in the Flathead River drainage of northwestern Montana. Eastern brook trout were released into two streams on the high plateau area of Cumberland Gap National Historical Park. This native fish disappeared during timber removal early in the present century.



Sections of streams at several campgrounds and picnic areas in the Great Smoky Mountains National Park are reserved for children--start them young!

Technical services provided by the Division to other Park Service areas included stream and lake surveys, creel censuses, planning and coordinating stocking programs, assisting in formulating angling regulations, and providing direction for the fishery program commensurate with National Park Service policies and objectives.



From the Cape Hatteras National Seashore to the Yellowstone National Park, the waters on Park Service lands provide some of the Nation's best fishing.



Fishery Management Programs on National Wildlife Refuges

Sport fishing is permitted on 74 National Wildlife Refuges where angling does not conflict with the primary objectives of the refuge program. Division personnel provided technical services to 58 refuges which contain 262 thousand acres of lakes and ponds and 45 miles of streams where 1.1 million man-days of fishing occurred in 1968. Bureau hatcheries planted 4.2 million fish in refuge waters--an 180 percent increase over 1967.

The Bureau's refuge system contains many large acreages of water that offer excellent opportunities for sport fishing for both cold-water and warm-water species. Division activities are centered around stream and lake rehabilitation, stream and lake surveys, developing stocking programs (including experimental releases), aquatic weed control (including phytoplankton), and angler interviews (primarily to determine fishing success).



Trying to catch adult northern pike on their spawning run is cold work for fishery biologists on the Valentine National Wildlife Refuge.

Fishery Management Programs on Miscellaneous Federal Areas

Twenty-three small Federal areas were provided fishery services during 1968. These areas range in purpose from the Federal Youth Center in Colorado to the Soldiers' Home, Washington, D.C. The 865 acres of ponds and lakes on these sites sustained 25,100 man-days of fishing and were stocked with 47,688 cold-water and warm-water fish from national fish hatcheries.



The Pueblo Army Depot, Colorado, sponsors a fishing derby each year for the handicapped. Photo - U.S. Army.

Fishery Management Programs on Indian Reservations

The Division assisted 62 Indian reservations with their fish management activities in 1968. Over 1,332,000 man-days of fishing occurred on 174,470 acres of ponds and lakes and 3,469 miles of streams. The fishing was sustained in part by stocking 7.2 million fish from Bureau hatcheries.

The development of sport fishing programs has resulted in a major tourist attraction on several Indian reservations. Sportsmen obviously enjoy the fine angling found on the many scenic reservations and substantial monetary benefits are realized by the tribes. The fishery programs also provide direct full-time employment for tribal members.

There are a number of indirect economic benefits resulting from the increased sport fishing. The development of motels, restaurants, tackle and bait shops, boat liveries, campgrounds, and guide service often follows the establishment of fish management programs.



Wheatfield Lake on the Navajo Indian Reservation, Arizona, is typical of the managed lakes on the area.



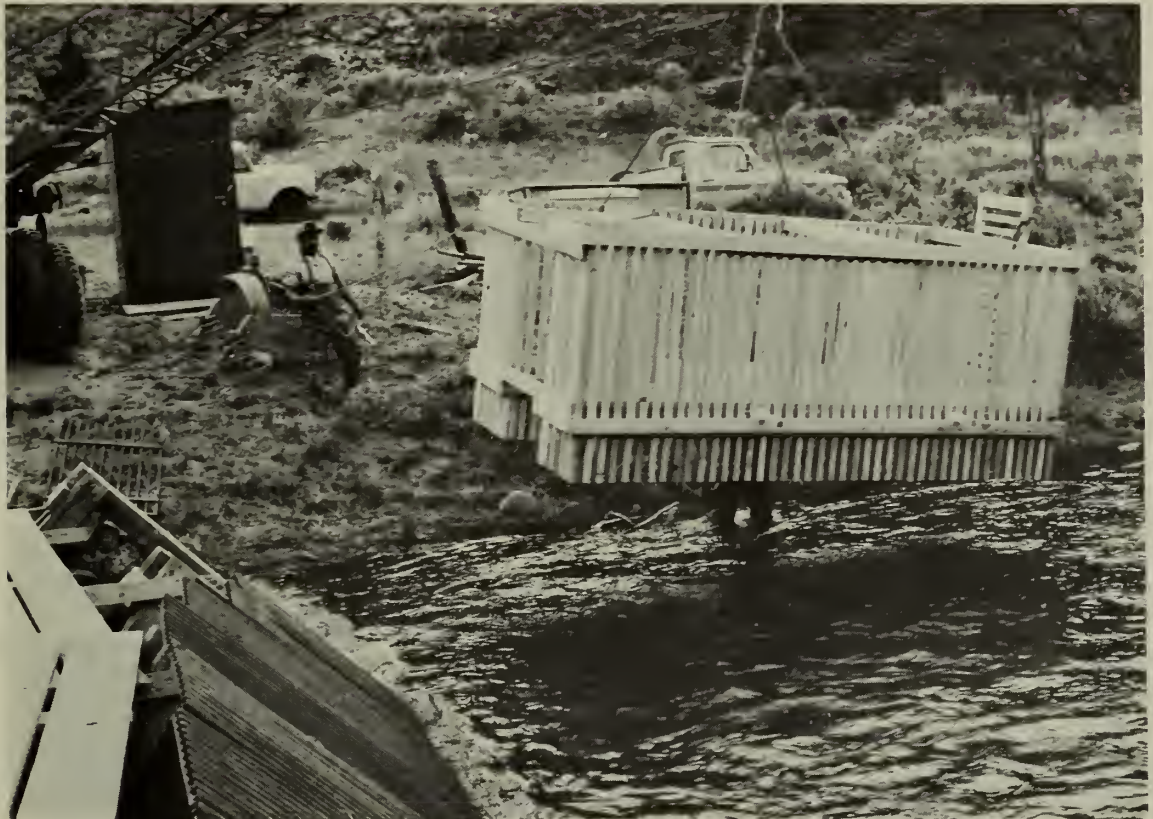
Fishery management biologist Don King and a member of the Summit Lake Paiute Tribe check eyed egg plants on the Reservation.



Cherokee Indian Bureau employee, Fishery Aid Manual Watty, with electric backpack seine is assisted by another tribal member in checking trout stream population.

Table 4.--Number of Indian Reservations Served During 1968

<u>State</u>	<u>Number</u>	<u>State</u>	<u>Number</u>
Arizona	11	New Mexico	10
California	3	New York	1
Colorado	2	North Carolina	1
Florida	1	North Dakota	3
Idaho	1	Oregon	2
Minnesota	2	South Dakota	4
Mississippi	1	Utah	1
Montana	6	Washington	7
Nebraska	1	Wyoming	1
Nevada	4		
		Total	62



Installing a new fish trap in the Warm Springs River, Warm Springs Indian Reservation, Oregon.



At Goose Lake on the Blackfeet Indian Reservation, Montana, a tribal member drills through the ice. A knowledge of thermal and chemical conditions of the water in winter is essential for managing Goose Lake.

Cooperative Fishery Units

The cooperative fishery unit program began in 1960 following the enactment of Public Law 86-686 (74 Stat. 733). The stated purpose of the Act is "To facilitate cooperation between the Federal Government, colleges and universities, the States, and private organizations for cooperative unit programs of research and education relating to fish and wildlife and for other purposes."

Each fishery unit is a cooperative undertaking involving the Bureau of Sport Fisheries and Wildlife, a college or university, and (with one exception) a State fish and game department. A coordinating committee, representing the participating agencies, provides general guidance to each unit, including review of proposals for graduate studies and budgets. The Bureau provides two highly trained fishery biologists to serve as unit leader and assistant leader.

During 1968, there were 23 units in operation. Unit staff members taught 62 courses including 38 formal courses with a total enrollment of 858 students. Supervision was provided to 187 graduate students and 127 undergraduate and special students. Doctor of Philosophy degrees were awarded to three unit students and 40 students obtained master's degrees. Thirteen of the graduates are continuing their education, 13 have accepted positions with State or Provincial fish and game departments, 10 are teaching, three are employed by the U.S. Bureau of Commercial Fisheries, two are in the military, one is in the Peace Corps, and one is serving as a private consultant.

The following includes the locations of the cooperative fishery units and brief summaries of their areas of interest.

Alabama, Auburn University, Auburn

Studies include basket culture of tilapia and catfish, production of tilapia in ponds, ecology of sculpins and basses (centrarchids), distribution of fishes, taxonomy, and monogenetic trematodes (parasites).

Arizona, University of Arizona, Tucson

The unit has been concerned with the various factors which affect the productivity of lakes, the ecology and movements of channel catfish, use of exotic fishes for sport fishing and weed control, and the production of fish in reclaimed wastewater.



On the job training for Cooperative Fishery Unit students.



Assistant Unit Leader, Louisiana Cooperative Fishery Unit, assists biologist in checking a lake on Public Health Service lands.



California Cooperative Fishery Unit personnel assisted in studies on the effects of the Santa Barbara oil spill.

California, Humboldt State College, Arcata

Humboldt State College is located about one mile from Humboldt Bay and five miles from the Pacific Ocean. Many of the studies concern fishes of the Bay and include distribution, abundance, growth rates, and early life histories of the more important sport and commercial species. Another important area of interest is the ecology of trout and salmon in northern California coastal streams.

Colorado, Colorado State University, Fort Collins

Colorado State University is located at the base of the Rocky Mountains. Unit activities are concerned with the ecology of mountain streams, the distribution and kinds of trouts, relict fish populations, production of bait fishes, trout culture, and the evaluation of hatchery-reared trout.

Georgia, University of Georgia, Athens

Athens, Georgia, is surrounded by numerous farm ponds and small lakes. Many of the projects of the Georgia Unit concern solving problems in managing small impoundments for sport fishing. Other projects include studies of mountain trout streams, large reservoirs, and striped bass in coastal rivers.



Cooperative Fishery Unit personnel from the University of Georgia assist a biologist in checking a lake on a military reservation.

Hawaii, University of Hawaii, Honolulu

The Hawaii Unit has several projects concerning freshwater fishes and limnology of lakes and streams, but much of the emphasis is on inshore marine biology. These latter projects include studies of fishes of estuaries, artificial and natural reefs, and bays. One study is being made on the life history of a native shrimp. Another concerns the introduction of abalone.

Idaho, University of Idaho, Moscow

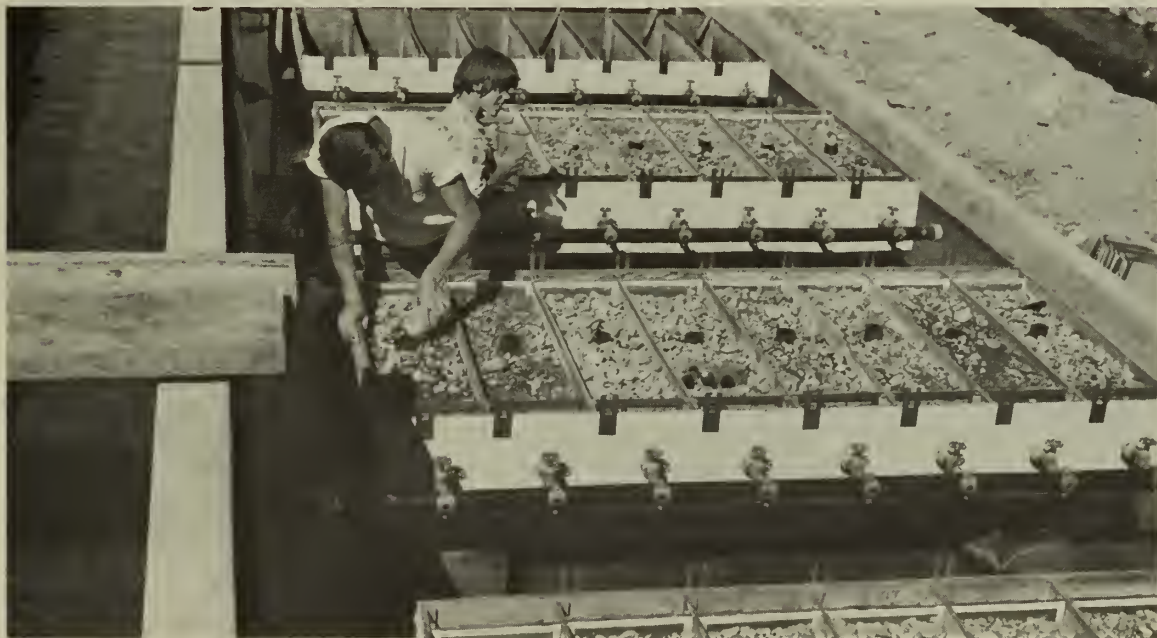
Most of the studies at the Idaho Unit are concerned with the ecology of stream fishes. These include studies of the following relationships: steelhead trout-chinook salmon, cutthroat trout-brook trout, and hatchery planted trout-young salmon and steelhead trout. Other studies include spawning and early life history of salmon and trout, identification of races of chinook salmon, food habits of the smallmouth bass, and an economic survey of Idaho sport fishing.

Iowa, Iowa State University, Ames

The program at the Iowa Unit is concerned with understanding the environmental factors affecting changes in species, size and age composition, and growth rates of warm-water fishes in ponds, lakes, reservoirs, and streams. Studies are concentrated on Clear and DeSoto Bend Lakes and the Des Moines and Mississippi Rivers.

Louisiana, Louisiana State University, Baton Rouge

Unit research efforts are on the ecology of the freshwater and shallow, brackish water biota in Louisiana and on the development of management techniques. Fishes under study include channel catfish, pompano, and red drum. Studies on crustacea include crawfish, shrimp, and crabs.



Idaho Cooperative Fishery Unit students placing fry in perforated stand-pipes during test to determine effects of spawning gravel composition on survival and emergence of salmon and steelhead fry.

Maine, University of Maine, Orono

Research interests of the Maine Unit are varied and include studies of anadromous sport fishes such as the Atlantic salmon and striped bass and freshwater fishes such as the Sunapee trout and smallmouth bass. Interests concern the quality of the aquatic environment, various phases of the life history and food chains. Other projects include the culture of Atlantic salmon, biology of estuarine crustaceans, pollution and water quality studies, and angler utilization of striped bass along the central Maine coast.

Massachusetts, University of Massachusetts, Amherst

Freshwater biological and limnological studies at the Massachusetts Unit include waters of the Connecticut and Millers Rivers and numerous local lakes and ponds. Marine studies are being carried out on the Weweantic River estuary and the Cape Cod Canal. Specific fishes under study include the American shad, winter flounder, tomcod, rainbow smelt, fallfish, cunner, and various trouts. The creel census methods used at Quabbin Reservoir and the methods used to collect marine sport fishery data are being evaluated.

Missouri, University of Missouri, Columbia

The program at the Missouri Unit includes studies of warm-water fish production and population dynamics in farm ponds. Fishes studied include largemouth and smallmouth bass, bluegill, gizzard shad, channel catfish, and northern pike. Cooperator studies are concerned with the limnology and ecology of strip mine ponds and the ecology and growth of fishes in the Missouri River, Thomas Hill Reservoir, and Montrose Lake. Two studies on the effects of pesticides on fishes are being conducted at the nearby Bureau of Sport Fisheries and Wildlife Fish Pesticide Laboratory.

Montana, Montana State University, Bozeman

The program at the Montana Unit emphasizes the ecology of trout streams. The continuing loss of trout stream habitat through channel alterations, dewatering, pollution, and sedimentation is a major problem in Montana and neighboring States. Most investigations deal with channel morphology, bank vegetation, artificial channel structures, minimum flow requirements, and sedimentation in relation to trout populations. Other projects include a study of yellow perch in Canyon Ferry Reservoir and fish populations in pothole lakes.



The extreme cold does not prevent Idaho Cooperative Fishery Unit students from sampling a stream to determine winter fish populations.



Students from the Alabama Cooperative Fishery Unit assist Unit Leader in collecting lake-run redeye bass on Halawakee Creek.

New York, Cornell University, Ithaca

The New York Unit at Cornell University is concerned with first-year mortalities of largemouth bass and the development of technology essential for study of young fishes. These studies include methods of marking young fish, the effects of temperature changes and oxygen levels on egg development, and the effects of chemical and physical factors and food supply on young bass.

North Carolina, North Carolina State University, Raleigh

The research at the North Carolina Unit has been concerned with the reproduction, growth, and heredity of sunfishes. New studies include the control of reproduction in sunfishes, artificial production of striped bass and striped bass hybrids, dynamics of the fishes of Lake Mattamuskeet and the movements of redbreast sunfish in a local stream.



Cooperative Fishery Unit graduate students John Merriner and Jerry West helped conduct a fish population study at Lake Mattamuskeet on the Mattamuskeet National Wildlife Refuge. Here the students remove long-nose gar from experimental gill nets.

Ohio, Ohio State University, Columbus

The Ohio Unit is concerned with the dynamics of fish populations in nearby reservoirs, the impact of pesticides on the aquatic environment, ecology and rehabilitation of strip mine ponds, and life cycles of freshwater mussels and rare fishes. In addition to work in central Ohio, the Unit has access to the excellent facilities at Stone Laboratory located on Gibralter Island in western Lake Erie.

Oklahoma, Oklahoma State University, Stillwater

The Oklahoma Unit has numerous projects dealing with life history studies of game and commercial fishes in reservoirs. Other projects concern the effects of artificial destratification of a reservoir, determination of live to dressed weight ratios of commercial fishes, evaluation of fish sampling methods, studies of fish parasites, and investigations of fish and fisheries of Lake Atitlan, Guatemala.

Oregon, Oregon State University, Corvallis

Two general types of studies are being carried out at the Oregon Unit. In the laboratory, genetic studies of salmonids are being made, while in the field, life history studies of marine and estuarine fishes are underway. Genetic studies are concerned with DNA homology, chromosomes, serum enzymes, and fish populations. Field studies include the life history of the redbellied surf perch and cutthroat trout in coastal streams.

Pennsylvania, Pennsylvania State University, University Park

Two areas of research are emphasized at the Pennsylvania Unit. The first deals with the ecology of fish in streams, ponds, and reservoirs. Studies include the factors which control the population size in fishes, interactions between population density and growth, reproduction and mortality and behavior. The second concerns stream ecology as it is affected by natural and man-made forces. It includes the effects of stream fluctuations on aquatic invertebrates and the effects of mine discharge and domestic pollution on the biota of Pennsylvania streams.

South Dakota, South Dakota State University, Brookings

The South Dakota Unit is concerned with the limnology and fishery biology of local shallow, eutrophic lakes. Many of these highly productive lakes are subject to periodic fish kills and overpopulations of stunted fish. Also of major interest are studies of the effects

of agricultural and domestic pollution on sport and commercial fishes and farm pond management.

Utah, Utah State University, Logan

The areas of program emphasis at the Utah Unit include studies of the effects of reservoir development on the biota of the Colorado River System, fitness of hatchery trout, ecology of stream-drift invertebrates, particularly those organisms utilized by trout, population genetics, and immunogenetics of rainbow trout.



Backyard swimming pools make excellent experimental ponds at Auburn University Cooperative Fishery Unit. This arrangement provides an outdoor laboratory for many short-term experiments which cannot be carried on indoors.

Virginia, Virginia Polytechnic Institute, Blacksburg

Studies at the Virginia Unit include the factors affecting striped bass culture, fishes of Lake Drummond in the Dismal Swamp, reservoir investigations including the life history and relationships of gizzard shad and the effects of a pumped-storage project on downstream water quality and fish production, effects of liming a soft-water lake, effects of strip mine pollution before and after reclamation, and a survey of preferences of Virginia fishermen.

Washington, University of Washington, Seattle

In addition to the University and the Bureau of Sport Fisheries and Wildlife, cooperators at the Washington Unit include the State Department of Game and the State Department of Fisheries. Projects include studies of the American shad spawning migrations, the effects of the fishery and environmental factors on the sockeye salmon run in the Quinault River, largemouth bass and crappie in Lake Washington, interactions between young coho salmon and steelhead trout, and the life history of the geoduck clam along Washington's coast.



Cooperative Fishery Unit personnel assisting in a Fintrol experiment, Moccasin Lake, Arizona.

Cooperation with the Division of Fish Hatcheries

A close working relationship between the Divisions of Fish Hatcheries and Fishery Services is necessary to provide the fishing public with better fishing at the most economical level. Fish Hatchery and Fishery Services personnel meet annually with State fish and game departments to determine State requirements and plan stocking schedules for fish from national fish hatcheries under the State-Federal Cooperative Stocking Agreements.

During 1968, more than 29 million fish weighing 2.5 million pounds were stocked from national fish hatcheries on programs receiving guidance from Fishery Services. Federal areas and Indian reservations were stocked with 15.9 million fish weighing 1.5 million pounds. Federal-State cooperative areas received 13.3 million fish that weighed one million pounds.



The Divisions of Fish Hatcheries, Fishery Services, and Fishery Research; the U.S. Air Force; the Florida Game and Fresh Water Fish Commission; and local interests participated in stocking the Choctawhatchee Bay with striped bass.

Pesticide Field Appraisal, Monitoring, and Research

Pesticide field appraisals were carried out in Regions 2, 3, 4, and 5. Division biologists participated in an appraisal of an application of Bidrin to about 300 acres of rangeland for grasshopper control in Colorado. Region 2 and Region 3 biologists cooperated in appraisal of an experimental application of Baytex for mosquito control near Toledo, Ohio. The Region 4 Pesticide Specialist continued field studies of the effect of 2-4-D applications for watermilfoil control in Currituck Sound, North Carolina, and completed sampling for arsenic residues at sites near Kennedy Space Flight Center, Florida, which had previously been treated with paris green. Our personnel participated in an appraisal of the effects of a Sumithion-spruce budworm control operation in Maine. Reports of these field appraisals were in preparation at the end of the year.



Experimental plots of white water lily treated with Casoron and 2-4,D.

Fishery Services personnel from all regions collected fish for both the spring and fall samples for the National Pesticide Monitoring Program. The spring sampling included removal of brains from each fish for determination of cholinesterase activity. This analysis was not carried out for the fall samples.

At the close of the year, the data had been tabulated and a report was being drafted for publication in the Pesticides Monitoring Journal.

The Division's efforts in pesticide research are limited to studies carried out by several Cooperative Fishery Units. At the close of the year, seven Units were engaged in nine research investigations of pesticides in relation to fish or other aquatic organisms.



Setting a gill net on the Genessee River, New York, to collect fish for the pesticide monitoring program.

Effects of Mineral Mining Operations on Fisheries

Fishery Services has two active projects concerned with the effects of acid mine drainage; namely, the Roaring Creek Demonstration Project and the Monongahela Basin Acid Mine Drainage Remedial Project.

Twenty-two seals were installed in a coal mine sealing project on Shavers Fork in the Monongahela National Forest, West Virginia. Water chemistry monitoring is continuing at the sealed areas to determine the effectiveness of this project.

The Virginia Cooperative Fishery Unit is beginning a study of the effects of abandoned manganese strip mines on the ecology of the South Fork of the Holston River in Virginia.



Governor Smith of West Virginia has implemented a mine sealing program to reduce acid drainage endangering the Bowden National Fish Hatchery. State prison labor is being used in this program, to which Fishery Services is providing technical assistance.

River Basin Coordination Projects

A Division biologist serves as Coordinator on each of the following programs: the Upper Mississippi River Conservation Committee (UMRCC); the Connecticut River Studies; the Delaware River Basin Commission; and the Hudson River Fishery Investigations.

The UMRCC program has made great strides in coordinating fishery activities of the five State agencies involved in managing 612 miles of the Mississippi River. The Coordinator edited a quarterly newsletter and assisted in the preparation of a leaflet describing 25 years of work performed by the committee. As a member of the steering committee, the UMRCC Coordinator prompted the establishment of the Mississippi River Research Consortium.

The Connecticut River Anadromous Fisheries Program deals with the management of both anadromous and resident sport fishes occurring in the river. Funds provided by power companies helped produce a report written by Division personnel entitled "Fish Passage Facilities Design Parameters for Connecticut River Dams." Division biologists designed a procedure for measuring mortality rates on salmon smolts moving through hydroelectric plants. Turbine mortality studies subsequently were conducted at four stations on the Connecticut River.

The Delaware River Anadromous Fisheries Study is conducted under the Federal Aid to Anadromous Fisheries Act. Field work began in April 1968 with initial studies directed toward American shad (Alosa sapidissima).

The Hudson River Fisheries Investigations Division Coordinator carried on field work which included plankton and egg sampling, openwater trawling, and tests at power plants evaluating methods to prevent the entry of fish into the plant intakes. A report summarizing the past three years' findings is scheduled for completion in 1969.

The River Basin Coordination Projects are a relatively new area of interest for the Division of Fishery Services. They are truly a cooperative venture. Agencies who participate include power companies, the States involved, other Divisions in the Bureau, and other private interests.



Plankton sampling gear used for striped bass egg and larval collection--Hudson River Fishery Investigations.



Seining shad on the Delaware River--Delaware River Coordination Project.

Colorado River Storage Project

The Division of Fishery Services performs staff functions in assisting the Coordinator, Colorado River Storage Project, in the inspection of fishery work performed under Section 8, Public Law 458, 84th Congress. The Project Leader, Vernal, Utah, Division Field Station, is responsible for contractual inspection of fishery investigations on Flaming Gorge, Navajo, Powell, and Blue Mesa Reservoirs.



Flaming Gorge Reservoir has become an extremely popular fishing spot.
Photo - Bureau of Reclamation.

Dale Hollow Reservoir Investigation, Tennessee and Kentucky

This cooperative study is concerned with developing a management program, including stocking, for a "second-story" trout fishery in this 27,000-acre southeastern reservoir so that management procedures may be applied to similar reservoirs in the Southeast. Various size trout have been stocked at different seasons since 1966. Data are being collected on the thermal-chemical lake strata, trout returns to the creel, trout distribution (vertical and horizontal), trout food habits, and growth. Evaluation of these findings will help formulate management guidelines for trout stocking in other two-story reservoirs in this region.

Agencies involved in the study are the Bureau of Sport Fisheries and Wildlife, the States of Tennessee and Kentucky, and the Corps of Engineers.



Vertical gill nets are used on the Dale Hollow second-story trout evaluation project in Tennessee.

Choctawhatchee Bay Striped Bass Study

A cooperative study was initiated on Choctawhatchee Bay, Florida, by the Divisions of Fishery Services, Fishery Research, and Fish Hatcheries with assistance from the Florida Game and Fresh Water Fish Commission, the Florida Board of Conservation, Eglin Air Force Base, and several local commercial fishermen.

An environmental study of the 100,000-acre estuary preceded the stocking of 118,000 fingerling and 5,000 sub-adult striped bass. Additional striped bass plants are scheduled for 1969 and 1970.

Monthly fish samples are taken to evaluate the stocking survival relative to establishing a fishable striped bass population. Studies include growth determinations, food habits, and movement.



Florida Congressman Sikes and Regional Supervisor Montgomery examine striped bass fingerlings during stocking operations on Choctawhatchee Bay in Florida.

Rare and Endangered Species

Additional plants of the rare Apache trout were made in Christmas Tree Lake, Fort Apache Indian Reservation, Arizona.

The Colorado Cooperative Fishery Unit continued research on the systematics of endangered species and the Family Salmonidae in the Rocky Mountain group of fishes.

An additional population of the Gila topminnow, Poeciliopsis accidentalis, was discovered in a spring area of the Gila River on the San Carlos Indian Reservation. Tribal officials are interested in the preservation of this unique area if funds are made available.

Westslope cutthroat trout stocking continued at Glacier National Park as part of a long-range Federal-State cooperative venture to preserve native fish species in the Flathead River drainage in northwestern Montana.



This remote, scenic stream on the Fort Apache Indian Reservation in Arizona is the home of the Apache trout. The Apache Trout is on the Bureau's rare and endangered list.

Other Activities

A close relationship is maintained at the Regional and field levels with State fish and game agencies and many cooperative projects and investigations were carried on during 1968. Additional cooperative activities included fishery investigations and stocking at Corps of Engineers' reservoirs, tagging and marking studies, fish population surveys, assistance in evaluation of proposed Soil Conservation Service projects, and providing manpower and equipment for special projects. Additionally, the State agencies are kept informed of management programs and projects of mutual concern.

Division biologists are often called upon to present conservation talks to civic and service organizations and sportsmen clubs and to assist in summer conservation workshops for school teachers.

Assistance also is provided to farm pond owners concerning management of these waters. This activity is primarily related to the farm pond stocking program.



Biologist Jim Harrison of the Central States Fishery Station talks to a group of Cub Scouts.

Table 5. -- Summary of Fishery Services on All Areas Served, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	57	71	125	228	125	606
Reports submitted	6	54	43	184	99	386
Waters under Management						
Acres of Lakes & Ponds	227,556	263,568	99,110	338,883	27,690	956,807
Miles of Streams	2,150	2,743	93	5,202	1,936	12,124
Acres of Fish Habitat Reclaimed or Improved	902	1,155	585	2,502	55	5,199
Miles of Stream Reclaimed or Improved	3	2	1	-	-	6
Acres of New Waters Developed	95	1,543	492	188	134	2,452
Man-Days of Fishing (Rounded)	1,242,800	2,711,400	658,400	2,715,800	1,170,900	8,499,300
Pounds of Hatchery Fish	714,812	679,795	43,037	457,532	606,370	2,521,546
Number of Hatchery Fish	7,266,496	9,069,324	2,599,520	4,900,332	5,374,879	29,210,551

Table 6. -- Summary of Fishery Services on Federal Areas & Indian Reservations, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	56	59	66	140	47	368
Reports submitted	6	45	42	104	63	260
Waters under Management						
Acres of Lakes & Ponds	186,231	128,328	98,525	189,560	19,215	621,859
Miles of Streams	2,150	2,652	93	5,181	1,892	11,968
Acres of Fish Habitat Reclaimed or Improved	902	1,155	183	2,473	29	4,742
Miles of Stream Reclaimed or Improved	3	2	1	-	-	6
Acres of New Waters Developed	95	1,533	492	188	51	2,359
Man-Days of Fishing	905,500	1,560,800	656,800	2,493,600	1,064,000	6,680,700
Pounds of Hatchery Fish	322,206	520,348	43,036	405,836	266,573	1,557,999
Number of Hatchery Fish	4,013,316	4,605,324	2,599,470	3,705,167	997,272	15,920,549

Table 7. -- Summary of Fishery Services on Department of Defense Areas, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	17	19	18	87	29	170
Reports submitted	3	16	11	68	30	128
Waters under Management						
Acres of Lakes & Ponds	13,341	1,508	552	7,892	892	24,185
Miles of Streams	34	4	43	21	33	135
Acres of Fish Habitat Reclaimed or Improved	112	72	8	876	11	1,079
Miles of Stream Reclaimed or Improved	-	1	-	-	-	1
Acres of New Waters Developed	87	24	62	180	41	394
Man-Days of Fishing	132,000	136,500	97,000	857,800	140,500	1,363,800
Pounds of Hatchery Fish	48,372	52,493	22,411	21,185	20,203	164,664
Number of Hatchery Fish	296,790	708,833	202,990	521,561	63,546	1,793,720

Table 8. -- Summary of Fishery Services on Air Force Bases, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	6	6	8	17	8	45
Reports submitted	-	5	6	13	11	35
Waters under Management Acres of Lakes & Ponds	339	131	261	1,602	252	2,585
Miles of Streams	14	-	-	-	2	16
Acres of Fish Habitat Reclaimed or Improved	107	8	6	242	-	363
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	17	17	-	62	-	96
Man-Days of Fishing	47,800	35,000	73,400	228,100	24,100	408,400
Pounds of Hatchery Fish	14,385	25,634	6,029	354	2,168	48,570
Number of Hatchery Fish	51,503	72,571	124,090	65,150	8,350	321,664

Table 9. -- Summary of Fishery Services on Army Installations, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	6	12	9	45	12	84
Reports submitted	-	10	5	35	11	61
Waters under Management Acres of Lakes & Ponds	634	577	291	4,119	549	6,170
Miles of Streams	20	4	43	6	30	103
Acres of Fish Habitat Reclaimed or Improved	5	64	2	572	-	643
Miles of Stream Reclaimed or Improved	-	1	-	-	-	1
Acres of New Waters Developed	-	3	62	104	1	170
Man-Days of Fishing	57,700	96,500	23,600	523,400	103,200	804,400
Pounds of Hatchery Fish	26,977	25,870	16,377	17,201	15,347	101,772
Number of Hatchery Fish	205,962	609,552	77,900	358,341	48,396	1,300,151

Table 10.-- Summary of Fishery Services on Navy & Marine Bases, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	5	1	1	25	9	41
Reports submitted	3	1	-	20	8	32
Waters under Management						
Acres of Lakes & Ponds	12,368	800	-	2,171	91	15,430
Miles of Streams	-	-	-	15	1	16
Acres of Fish Habitat Reclaimed or Improved	-	-	-	62	11	73
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	70	4	-	14	40	128
Man-Days of Fishing	26,500	5,000	-	106,300	13,200	151,000
Pounds of Hatchery Fish	7,010	989	5	3,630	2,688	14,322
Number of Hatchery Fish	39,325	26,710	1,000	98,070	6,800	171,905

Table 11. -- Summary of Fishery Services on Veterans Administration Areas, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	-	2	7	5	5	19
Reports submitted	-	1	4	3	1	9
Waters under Management Acres of Lakes & Ponds	-	14	95	15	53	177
Miles of Streams	-	-	1	-	-	1
Acres of Fish Habitat Reclaimed or Improved	-	-	2	4	-	6
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	-	12	-	-	12
Man-Days of Fishing	-	4,200	18,300	10,600	6,600	39,700
Pounds of Hatchery Fish	-	2,207	3,819	402	1,222	7,650
Number of Hatchery Fish	-	2,015	6,300	11,800	4,800	24,915

Table 12. -- Summary of Fishery Services on National Forests, 1968

	R E G I O N						Total
	1	2	3	4	5	6	
Areas visited	-	1	2	6	6	15	15
Reports submitted	-	-	4	7	24	35	35
Waters under Management	-	-	149	8,800	12,637	21,586	21,586
Acres of Lakes & Ponds	-	-	4	4,093	1,834	5,931	5,931
Miles of Streams	-	-	3	-	18	21	21
Acres of Fish Habitat Reclaimed or Improved	-	-	1	-	-	1	1
Miles of Stream Reclaimed or Improved	-	-	28	-	10	38	38
Acres of New Waters Developed	-	-	2,100	931,800	889,000	1,822,900	1,822,900
Man-Days of Fishing	-	-	1,333	257,550	244,878	503,761	503,761
Pounds of Hatchery Fish	-	-	15,245	894,559	927,426	1,837,230	1,837,230
Number of Hatchery Fish	-	-					

Table 13. -- Summary of Fishery Services on National Parks, 1968

	R E G I O N					
	1	2	3	4	5	Total
Areas visited	3	2	-	6	-	11
Reports submitted	-	8	-	4	-	12
Waters under Management						
Acres of Lakes & Ponds	34,612	103,061	-	187	-	137,860
Miles of Streams	764	614	-	1,007	-	2,385
Acres of Fish Habitat Reclaimed or Improved	-	-	-	-	-	-
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	-	-	-	-	-
Man-Days of Fishing	258,100	424,700	-	264,600	-	947,400
Pounds of Hatchery Fish	21,303	8	-	32,000	-	53,331
Number of Hatchery Fish	575,931	20,000	-	104,115	-	700,046

Table 14 -- Summary of Fishery Services on National Wildlife Refuges, 1968

	R E G I O N					
	1	2	3	4	5	Total
Areas visited	3	5	18	27	5	58
Reports submitted	1	5	9	15	8	38
Waters under Management						
Acres of Lakes & Ponds	5,456	6,186	76,765	172,324	1,986	262,717
Miles of Streams	10	-	10	-	25	45
Acres of Fish Habitat Reclaimed or Improved	290	82	105	1,585	-	2,062
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	-	10	2	-	12
Man-Days of Fishing	36,200	230,600	497,000	377,200	8,700	1,149,700
Pounds of Hatchery Fish	6,945	10,925	718	6,303	270	25,161
Number of Hatchery Fish	66,856	1,068,311	1,213,460	1,945,600	1,500	4,295,727

Table 15. -- Summary of Fishery Services on Miscellaneous Federal Areas, 1968

	R E G I O N					
	1	2	3	4	5	Total
Areas visited	1	4	11	6	1	23
Reports submitted	-	4	2	5	-	11
Waters under Management						
Acres of Lakes & Ponds	103	56	381	294	31	865
Miles of Streams	-	2	-	-	-	2
Acres of Fish Habitat Reclaimed or Improved	-	4	2	2	-	8
Miles of Stream Reclaimed or Improved	-	1	-	-	-	1
Acres of New Waters Developed	-	-	-	-	-	-
Man-Days of Fishing	1,000	5,700	7,400	10,000	1,000	25,100
Pounds of Hatchery Fish	500	7,500	252	1,124	-	9,376
Number of Hatchery Fish	10,000	20,700	12,270	4,718	-	47,688

Table 16. -- Summary of Fishery Services on Indian Reservations, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	32*	26	10	3	1	(62) 72
Reports submitted	2	11	12	2	-	27
Waters under Management						
Acres of Lakes & Ponds	132,719	17,503	20,553	48	3,647	174,470
Miles of Streams	1,342	2,032	35	60	-	3,469
Acres of Fish Habitat Reclaimed or Improved	500	997	63	6	-	1,566
Miles of Stream Reclaimed or Improved	3	-	-	-	-	3
Acres of New Waters Developed	8	1,509	380	6	-	1,903
Man-Days of Fishing	478,200	759,100	35,000	41,600	18,200	1,332,100
Pounds of Hatchery Fish	245,086	447,253	14,503	87,272	-	794,114
Number of Hatchery Fish	3,063,739	2,785,485	1,149,205	222,814	-	7,221,243

*Represents total number of visits to 22 Indian Reservations.

Table 17. -- Summary of Fishery Services on State-Federal Cooperative Areas, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	1	5	1	3	22	32
Reports submitted	-	5	1	2	11	19
Waters under Management						
Acres of Lakes & Ponds	41,324	135,100	-	49,000	8,173	233,597
Miles of Streams	-	91	-	21	33	145
Acres of Fish Habitat Reclaimed or Improved	-	-	-	-	-	-
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	-	-	-	-	-
Man-Days of Fishing	335,700	1,117,000	*-	217,600	95,300	1,765,600
Pounds of Hatchery Fish	392,088	151,402	-	48,904	354,286	946,680
Number of Hatchery Fish	3,249,670	4,446,000	-	1,065,065	4,358,550	13,119,285

*Upper Mississippi and Mark Twain National Wildlife Refuges not included; managed as part of the Upper Mississippi River Conservation Committee program. Creel estimate indicate 978,500 angler days on 612 miles of the Mississippi River from Alton, Illinois to Hastings, Minnesota (398,675 surface acres).

Table 18. -- Summary of Fishery Services on Other Public Areas, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	-	-	-	1	3	4
Reports submitted	-	-	-	2	2	4
Waters under Management						
Acres of Lakes & Ponds	-	-	-	100,000	197	100,197
Miles of Streams	-	-	-	-	-	-
Acres of Fish Habitat Reclaimed or Improved	-	-	-	-	2	2
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	-	-	-	-	-
Man-Days of Fishing	-	-	-	-	6,600	6,600
Pounds of Hatchery Fish	-	-	-	2,402	3,734	6,136
Number of Hatchery Fish	-	-	-	123,000	10,395	133,395

Table 19. -- Summary of Fishery Services on Private Areas, 1968

	R E G I O N					Total
	1	2	3	4	5	
Areas visited	-	7	58	84	53	202
Reports submitted	-	4	-	76	23	103
Waters under Management Acres of Lakes & Ponds	1	140	585	323	105	1,154
Miles of Streams	-	-	-	-	11	11
Acres of Fish Habitat Reclaimed or Improved	-	-	402	29	24	455
Miles of Stream Reclaimed or Improved	-	-	-	-	-	-
Acres of New Waters Developed	-	10	-	-	83	93
Man-Days of Fishing	1,600	33,600	1,600	4,600	5,000	46,400
Pounds of Hatchery Fish	518	8,045	1	390	1,777	10,731
Number of Hatchery Fish	3,510	18,000	50	7,100	8,662	37,322

Table 20.--Summary of Fishery Services on Federal areas
and Indian Reservations, 1965-1968

	Number of Visits	Number of Reports	Acres of Lakes and Ponds	Miles of Streams	Lakes Reclaimed or Improved	Streams Reclaimed or Improved	Acres of New Waters	Man-days of Fishing (1,000's)	Hatchery Fish 1,000's Pounds	Hatchery Fish Numbers (1,000's)
Department of Defense	1965 186	137	25,277	178	1,077	29	346	969.8	111.2	1,396.7
	1966 184	127	25,115	179	299	27	513	992.9	124.6	1,789.4
	1967 153	95	25,201	116	564	2	363	1,215.2	127.6	1,463.0
	1968 170	128	24,185	135	1,079	1	394	1,363.8	164.7	1,793.7
Veterans Administration	1965 9	1	65	6	--	--	--	18.9	5.3	14.5
	1966 15	6	65	6	2	--	3	24.2	4.4	15.7
	1967 16	6	190	1	--	--	3	26.2	3.3	14.2
	1968 19	9	177	1	6	--	12	39.7	7.7	24.9
National Forests	1965 20	24	5,716	3,528	163	34	35	1,863.4	327.1	1,491.4
	1966 14	24	5,731	3,598	173	3	--	1,973.6	299.7	1,480.9
	1967 16	18	19,947	3,464	241	--	7,763	1,684.5	433.5	2,737.9
	1968 15	35	21,586	5,931	21	1	38	1,822.9	503.8	1,837.2
National Parks	1965 11	34	112,137	1,705	--	10	24	734.6	19.2	325.2
	1966 10	9	112,326	1,540	--	10	--	813.1	32.5	262.5
	1967 10	15	124,213	2,135	63	2	--	902.3	39.1	388.6
	1968 11	12	137,860	2,385	--	--	--	947.4	53.3	700.0
National Wildlife Refuges	1965 56	61	142,305	82	487	--	4	424.3	2.3	7,464.8
	1966 60	27	192,386	32	240	2	3	449.8	9.5	1,656.0
	1967 60	26	226,314	32	788	--	--	809.9	5.8	1,522.3
	1968 58	38	262,717	45	2,062	--	12	1,149.7	25.2	4,295.7
Miscellaneous Federal Areas	1965 96	83	2,587	8	2	1	255	20.4	5.7	177.2
	1966 17	20	5,213	8	305	--	301	40.4	8.2	1,018.6
	1967 17	7	3,037	--	--	1	70	51.2	8.7	45.4
	1968 23	11	865	2	8	1	--	25.1	9.4	47.7
Indian Reservations	1965 59	39	149,382	3,120	507	19	162	911.3	468.7	4,249.2
	1966 67	42	370,893	3,146	1,058	5	801	1,068.9	580.6	5,866.7
	1967 60	41	155,839	3,618	2,233	74	4,980	1,112.9	852.8	5,182.6
	1968 72	27	174,470	3,469	1,566	3	1,903	1,332.1	794.1	7,221.2
Totals	1965 437	379	437,469	8,627	2,166	93	826	4,942.7	939.5	15,119.0
	1966 367	255	711,729	8,509	2,077	47	1,621	5,362.9	1,059.5	12,089.8
	1967 332	208	554,741	9,366	3,889	79	13,055	5,802.2	1,473.1	11,354.1
	1968 368	260	621,859	11,968	4,742	6	2,359	6,680.7	1,558.2	15,920.4

